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L2: Entry 1 of 3

File: USPT

Jan 9, 2001

US-PAT-NO: 6173159

DOCUMENT-IDENTIFIER: US 6173159 B1

TITLE: Wireless spread spectrum ground link-based aircraft data communication system for updating flight management files

DATE-ISSUED: January 9, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Wright; Thomas H.	Indialantic	FL		
Delpak; Ramzi	Melbourne	FL		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Harris Corporation	Palm Bay	FL			02

APPL-NO: 09/344902 [\[PALM\]](#)

DATE FILED: June 25, 1999

INT-CL-ISSUED: [07] H04B 7/00, G08B 21/00

INT-CL-CURRENT:

TYPE IPC                      DATE  
CIPP H04 B 7/185    20060101

US-CL-ISSUED: 455/66; 455/67.1, 455/431, 701/14, 701/29, 701/35, 340/945, 340/825.15, 340/825.72, 375/200, 375/219, 342/36

US-CL-CURRENT: 455/66.1; 340/3.5, 340/825.72, 340/945, 342/36, 375/130, 375/219, 455/431, 455/67.11, 455/67.13, 455/67.16, 701/14, 701/29, 701/35

FIELD-OF-CLASSIFICATION-SEARCH: 455/66, 455/67.1, 455/73, 455/431, 701/3, 701/13, 701/14, 701/29, 701/35, 340/945, 340/961, 340/971, 340/825.69, 340/825.72, 340/825.15, 340/825.16, 375/200, 375/219, 375/220, 342/33, 342/34, 342/36  
See application file for complete search history.

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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PAT-NO

ISSUE-DATE

PATENTEE-NAME

US-CL

<input type="checkbox"/>	<u>4642775</u>	February 1987	Cline et al.	701/200
<input type="checkbox"/>	<u>4729102</u>	March 1988	Miller, Jr. et al.	701/14
<input type="checkbox"/>	<u>4788531</u>	November 1988	Corwin et al.	340/945
<input type="checkbox"/>	<u>4872182</u>	October 1989	McRae et al.	375/141
<input type="checkbox"/>	<u>5022024</u>	June 1991	Paneth et al.	370/334
<input type="checkbox"/>	<u>5339330</u>	August 1994	Mallinckrodt	370/325
<input type="checkbox"/>	<u>5359446</u>	October 1994	Johnson et al.	359/143
<input type="checkbox"/>	<u>5459469</u>	October 1995	Schuchman et al.	342/32
<input type="checkbox"/>	<u>5463656</u>	October 1995	Polivka et al.	370/320
<input type="checkbox"/>	<u>5761625</u>	June 1998	Honcik et al.	701/14
<input type="checkbox"/>	<u>5890079</u>	March 1999	Levine	701/14

## FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	CLASS
0 407 179 A1	July 1990	EP	
2 276 066	September 1994	GB	

ART-UNIT: 276

PRIMARY-EXAMINER: Crosland; Donnie L.

ATTY-AGENT-FIRM: Allen, Dyer, Doppelt, Milbrath &amp; Gilchrist, P.A.

## ABSTRACT:

A system and method updates flight management files in accordance with the present invention and provides a retrievable record of the flight performance of an aircraft. A flight management computer is positioned on board the aircraft and interfaces and provides flight critical data received from flight navigation database files to a plurality of aircraft navigation and operational components located throughout the aircraft. A ground data link unit includes a data store that accumulates and stores flight performance data. A spread spectrum transceiver coupled to the data store transmits the stored flight performance data and uploads navigation database files over a spread spectrum communication signal. A controller is operatively connected to the data store, spread spectrum transceiver and flight management computer and receives the uploaded flight navigation database files and transfers the database files to a flight management computer. The airport based spread spectrum transceiver includes a receiver that receives the spread spectrum signal from the aircraft and demodulates the signal to obtain flight performance data. A transmitter transmits flight navigation database files to the aircraft over a second spread spectrum communication signal based on a unique tail number identifier.

32 Claims, 20 Drawing figures

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File: USPT

Jan 9, 2001

DOCUMENT-IDENTIFIER: US 6173159 B1

TITLE: Wireless spread spectrum ground link-based aircraft data communication system for updating flight management files

Detailed Description Text (8):

Additionally, engine events are sensed and stored not only in the archival storage during flight of an aircraft, but also downloaded during the first 30 seconds of take-off and/or during initial climb. Thus, it is possible for a maintenance crew or other flight operations control center to obtain data during initial take-off and climb to aid in determining whether engine maintenance would be required at the destination station. It is also possible to download OOII times of an aircraft. Additionally, data such as the weight of the remaining fuel can be downloaded and used for refueling planning. Last minute changes in gate assignment can be uploaded. En route wind and temperature data can be downloaded and used to enhance the flight planning of subsequent flights over the same route.

Detailed Description Text (26):

Air Traffic Control (ATC) at busy airports requires that aircraft operate under Instrument Flight Rules (IFR) to comply with a "gate system," which provides lateral separation between arriving and departing aircraft. FIG. 1 is one type of gate system of an aircraft, which in this example, is located in Calgary. Aircraft entering the airspace enter along the Standard Terminal Arrival Routes (STAR), shown in a dotted line. Departing aircraft are vectored to exit the airspace on one of the outbound Standard Instrument Departure (SID) gates, shown in solid, circular arc lines. The actual departure gate assigned is the gate that is closest to the route of a flight.

Detailed Description Text (67):

Other post messaging applications, as will be described below, and other applications as suggested to those skilled in the art can also be developed with the ground data link unit of the present invention. There are also en route data messaging applications that occur during approach that also lend themselves to the GDL air-to-ground link of the present invention. Flight crews currently phone in their fuel weight so that ground operations can calculate how much fuel will need to be added for the next flight. This allows more efficient scheduling and control over fuel resources. Also at this time, the aircraft crew receives their gate assignment from ground operations. En route wind and temperature data could also be monitored during flight and automatically relayed to dispatch prior to landing to aid in flight planning.

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L2: Entry 3 of 3

File: USPT

Aug 20, 1996

US-PAT-NO: 5548515

DOCUMENT-IDENTIFIER: US 5548515 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and system for airport control and management

DATE-ISSUED: August 20, 1996

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Pilley; Harold R.	Deering	NH	03244	
Pilley; Lois V.	Deering	NH	03244	

APPL-NO: 08/117920   [PALM]

DATE FILED: September 7, 1993

PARENT-CASE:

This application is a continuation-in-part of U.S. patent application Ser. No. 07/758,852, filed on Sep. 12, 1991, which in turn is a continuation-in-part of U.S. patent application Ser. No. 07/593,214, filed on Oct. 9, 1990, now U.S. Pat. No. 5,200,902, which issued on Apr. 6, 1993 .

INT-CL-ISSUED: [06] G06F 163/00

INT-CL-CURRENT:

TYPE	IPC	DATE
CIPS	<u>G08 G 5/00</u>	20060101
CIPS	<u>B64 F 5/00</u>	20060101
CIPS	<u>G01 C 23/00</u>	20060101
CIPS	<u>G01 S 1/00</u>	20060101
CIPS	<u>G01 S 1/04</u>	20060101
CIPS	<u>G01 S 5/00</u>	20060101
CIPS	<u>G01 S 5/14</u>	20060101
CIPS	<u>G08 G 5/06</u>	20060101

US-CL-ISSUED: 364/439; 364/461, 342/36, 342/456, 340/961

US-CL-CURRENT: 701/120; 340/961, 342/36, 342/456, 701/301

FIELD-OF-CLASSIFICATION-SEARCH: 364/427, 364/428, 364/436, 364/439, 364/440, 364/441, 364/460, 364/461, 73/178T, 340/903, 340/435, 340/961, 342/29, 342/36, 342/37, 342/38, 342/454, 342/455, 342/456

See application file for complete search history.

PRIOR-ART-DISCLOSED:

## U.S. PATENT DOCUMENTS

Search Selected

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	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
<input type="checkbox"/>	<u>3868497</u>	February 1975	Vietor	364/440
<input type="checkbox"/>	<u>3875379</u>	April 1975	Vietor	364/440
<input type="checkbox"/>	<u>4706198</u>	November 1987	Thurman	364/439
<input type="checkbox"/>	<u>4823272</u>	April 1989	Inselberg	364/439
<input type="checkbox"/>	<u>4845629</u>	July 1989	Murga	364/439
<input type="checkbox"/>	<u>5200902</u>	April 1993	Pilley	364/439
<input type="checkbox"/>	<u>5265023</u>	November 1993	Sokkappa	364/439
<input type="checkbox"/>	<u>5268698</u>	December 1993	Smith, Sr. et al.	364/439
<input type="checkbox"/>	<u>5321615</u>	June 1994	Frisbie et al.	364/439
<input type="checkbox"/>	<u>5375058</u>	December 1994	Bass	364/427

ART-UNIT: 234

PRIMARY-EXAMINER: Chin; Gary

ATTY-AGENT-FIRM: Dishong; George W.

## ABSTRACT:

An improved airport control/management system for controlling and managing the surface and airborne movement of vehicular and aircraft within a defined and selected airport space envelope of an airport, the traffic, comprising apparatus for establishing a precise 3-dimensional digital map of the selected airport space envelope, the map containing GNSS positioning system reference points, a computer with a monitor screen for receiving and displaying the 3-dimensional map, transmit and receive radio equipment located on at least one vehicle/aircraft in the airport space envelope to generate and transmit continuous GNSS-based location reports, a receiver associated with the computer to receive the reports from the vehicle/aircraft, programming associated with the computer and using the reports to superimpose 3-dimensional image corresponding to a path of the vehicle/aircraft onto the 3-dimensional map, apparatus associated with the 3-dimensional map for generating airport control and management signals as a function of the vehicle/aircraft path and computer aided design programming for manipulation of the 3-dimensional map and the image of the vehicle/aircraft and the path to a desired apparent line of observation, to control the traffic in the airport, the improvement comprising: GNSS compatible computer processing methods which support airport independent management and control for zone incursion, collision detection, on and off course detection, assignment of air traffic controller responsibility, scheduling and lighting control. GNSS compatible databases are created which support a true airport independent processing framework which supports a seamless

airport environment located anywhere in the world.

14 Claims, 16 Drawing figures

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L2: Entry 3 of 3

File: USPT

Aug 20, 1996

DOCUMENT-IDENTIFIER: US 5548515 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Method and system for airport control and management

Abstract Text (1):

An improved airport control/management system for controlling and managing the surface and airborne movement of vehicular and aircraft within a defined and selected airport space envelope of an airport, the traffic, comprising apparatus for establishing a precise 3-dimensional digital map of the selected airport space envelope, the map containing GNSS positioning system reference points, a computer with a monitor screen for receiving and displaying the 3-dimensional map, transmit and receive radio equipment located on at least one vehicle/aircraft in the airport space envelope to generate and transmit continuous GNSS-based location reports, a receiver associated with the computer to receive the reports from the vehicle/aircraft, programming associated with the computer and using the reports to superimpose 3-dimensional image corresponding to a path of the vehicle/aircraft onto the 3-dimensional map, apparatus associated with the 3-dimensional map for generating airport control and management signals as a function of the vehicle/aircraft path and computer aided design programming for manipulation of the 3-dimensional map and the image of the vehicle/aircraft and the path to a desired apparent line of observation, to control the traffic in the airport, the improvement comprising: GNSS compatible computer processing methods which support airport independent management and control for zone incursion, collision detection, on and off course detection, assignment of air traffic controller responsibility, scheduling and lighting control. GNSS compatible databases are created which ~~support a true~~ airport independent processing framework which supports a seamless airport environment located anywhere in the world.

CLAIMS:

5. A method for seamless 3-dimensional airport traffic management from a central control facility using a computer system incorporating on and off course processing for at least one vehicle of a plurality of vehicles said plurality of vehicles including aircraft and surface vehicular equipment operating at an airport, said method comprising the steps of:

a. adopting an Earth Centered Earth Fixed coordinate frame for processing by said computer system;

b. selecting an airport, said selected airport referenced to said Earth Centered Earth Fixed coordinate frame;

c. establishing a travel path waypoints database for said selected airport, said travel path waypoints database containing 3-dimensional waypoints referenced to said Earth Centered Earth Fixed coordinate frame;

d. establishing a vehicle database, said vehicle database containing identification

and position information referenced to said Earth Centered Earth Fixed coordinate frame for said at least one vehicle operating at said selected airport;

e. generating for said at least one vehicle an assigned travel path selected from said travel path waypoints database;

f. determining the previous and next waypoints along said assigned travel path;

g. establishing for said at least one vehicle, a route zone for said assigned travel path, using said previous and next waypoints;

h. determining if said position information for said at least one vehicle contained in said vehicle database is outside of said route zone; and

i. setting for said at least one vehicle an off course flag when said position information for each said at least one vehicle contained in said vehicle database is outside of said route zone, thereby making an alert when said at least one vehicle is off course.

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# Refine Search

## Search Results -

Terms	Documents
L1 and ((schedul\$ or rout\$) with (propos\$ or plan\$ or assign\$))	3

Database:

US Pre-Grant Publication Full-Text Database  
 US Patents Full-Text Database  
 US OCR Full-Text Database  
 EPO Abstracts Database  
 JPO Abstracts Database  
 Derwent World Patents Index  
 IBM Technical Disclosure Bulletins

Search:

L2

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## Search History

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Name  
 result set

*DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR*

L2 L1 and ((schedul\$ or rout\$) with (propos\$ or  
 plan\$ or assign\$))

3 L2

L1 6282487.pn. or 6160998.pn. or 5548515.pn. or  
 6173159.pn.

4 L1

END OF SEARCH HISTORY

Ser. No. 10/084,313  
Art Unit 3661

**SPEC/"AIRCRAFT ROUTING" AND SPEC/"pre-flight assign": 0 patents.**

**((SPEC/"AIRCRAFT ROUTING" AND SPEC/"flight assign") AND SPEC/proposal) AND**

**SPEC/maintenance): 0 patents.**

**((((SPEC/AIRCRAFT AND SPEC/ROUTE) AND SPEC/"flight assign") AND SPEC/proposal) AND**

**SPEC/maintenance): 0 patents.**

No art in US database suggests above topic simultaneously/together (of above key terms). Therefore, only

112, 1<sup>st</sup> para. rejections are applied.

Application Serial No. 10/084,313  
Art Unit 3661

**Results of Search in US Patents Text Collection db for:**

**ACLM/"proposed plan" AND ACLM/flight: 0 patents.**

**Results of Search in US Patents Text Collection db for:**

**(ACLM/"proposed assignment" AND ACLM/flight): 0 patents**